REMARKS

The Examiner is thanked for the due consideration given the application.

Claims 1, 2 and 4-7, 9-19 and 21 are pending in the application. Claims 8 and 20 have been cancelled and their subject matter (flash welding and forging) has been generally incorporated into the independent claims (1, 12 and 15). Other claim amendments improve the language in a non-narrowing fashion.

No new matter is believed to be added to the application by this amendment.

Art Rejections

Claims 1-2, 4-9, and 11-17 and 19-21 have been rejected under 35 U.S.C. §103(a) as being unpatentable over KAIS (US 6,177,205) in view of BHADESHIA (US 5,879,474). Claims 10 and 18 have been rejected under 35 U.S.C. §103(a) as being obvious over KAIS and BHADESHIA and the related art described in the last six lines of page 3 of the specification.

These rejections are respectfully traversed.

The present invention pertains to a flash welded and forged stretch of rail that is formed from bainitic steel. Typically, claim 1 of the present invention sets forth:

"*A stretch of rail comprising a railway switch element made from high-alloy steel, in which at least one alloy element has a content equal to at least 5% by weight, and a length of rail made from medium-alloy steel, directly welded to one another by* ***flash welding and forging****, wherein the length of rail is formed*

from a medium-alloy low-carbon steel in which the carbon content is less than 0.55% by weight ***and which is a bainitic steel.***"

The welded bainitic rail of the present invention is illustrated in Figures 1 and 2 of the application, which are reproduced below.

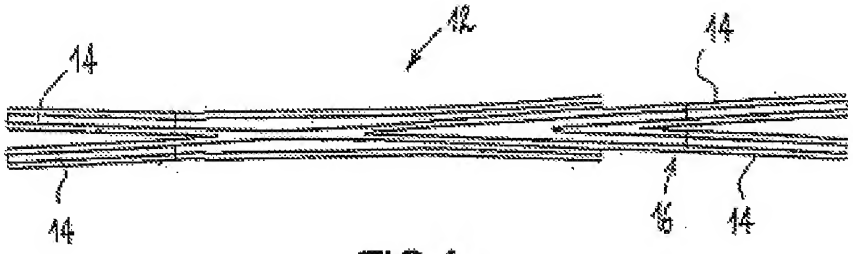

FIG.1

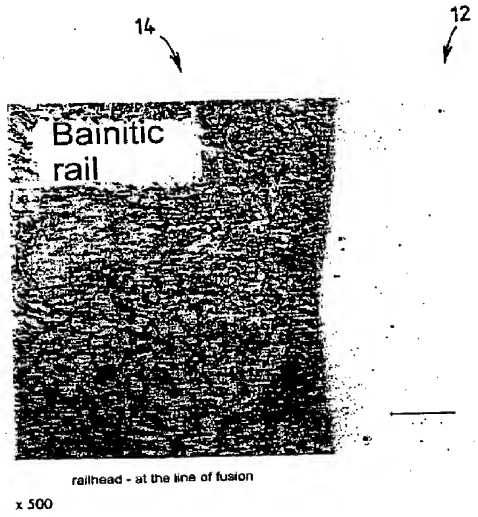

FIG.2

Figure 2 of the application shows the appearance of a weld 16 which is schematically illustrated in Figure 1. On this microphotograph, which is enlarged five hundred times, the flash welded and forged interface appears to be very neat between the low-carbon bainitic steel and the high-alloy steel, the two

steels being interpenetrated in a satisfactory manner. This represents a result that is truly unexpected over the applied art references.

In the instant claims, the application sets forth a stretch of rails in which a length of rail is directly welded to the railway switch element by flash welding and forging. The length of rail and the switch element being made of the steels are also set forth in the claims.

It should be emphasized that "directly welded by flash welding and forging" means clearly that the stretch of rail and the switch element are welded by flash welding and forging without any insert between the stretch of rail and the switch element.

The amended claims are thus allowable for the following reasons:

1) "Welded by flash welding and forging" is clearly distinctive of the product. For one of skill in the art, it is easy to determine by metallurgical examination if the weld is obtained by a process like flash welding and forging or flash butt welding, which are similar, or by a process like electron beam welding, which is very different from flash welding.

When welding is performed by flash welding and forging or flash butt welding, the HAZ (heat affected zone) thickness is of some millimeters and is affected by plastic deformation, which is visible by metallographic examination. When welding is

performed by electron beam welding, the HAZ thickness is clearly lower and there is no plastic deformation.

Moreover, the properties of the welds are not the same.

2) The subject of claim 1 is clearly distinct from KAIS, because in KAIS when the stretch of rail is connected to the switch element by flash butt welding or build up the weld, a nickel base alloy insert is absolutely essential.

The insert is considered essential by KAIS, because KAIS' problem is a problem of welding a stretch of rail made from carbon steel on a switch element made from high alloy steel.

BHADESHIA describes only a low or medium alloy steel end the weld properties for welding on itself (see Figure 7, reproduced below).

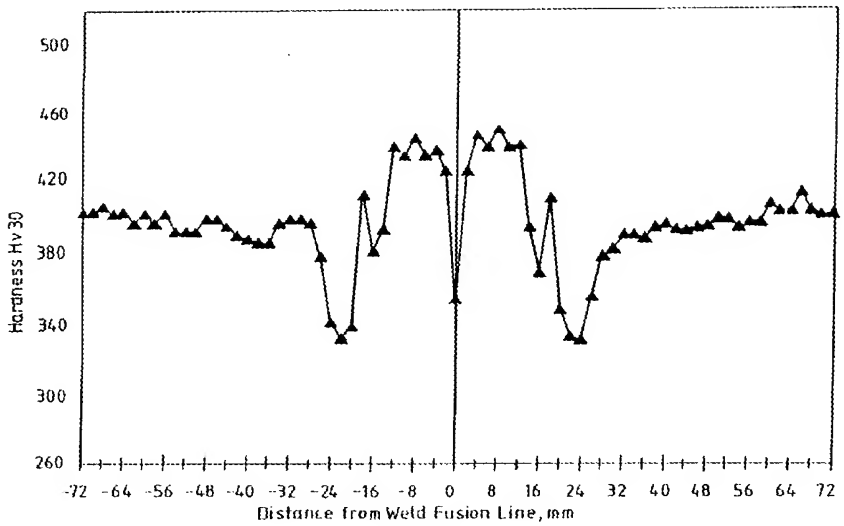

FIG. 7

In Figure 7 of BHADESHIA the hardness curves are about the same on both sides of the weld fusion line. This means that the steel is the same on both sides of the weld fusion line. See column 5, lines 43-48.

BHADESHIA also does not describe the welding properties of low or medium alloy steel on high alloy steel

As the properties of a junction by welding strongly depends on the nature of the steels to be joined (In the present case, it is carbon or low alloyed steel on high alloyed steel, not low or medium alloyed steel on low or medium alloyed steel.). BHADESHIA is accordingly not a relevant document.

It would not occur to a person of skill in the art to search for information in BHADESHIA in order to find solutions to the problem solved by the present invention. Moreover, no relevant information can be found in BHADESHIA.

3) Regarding the heat treatment, the assertion set forth in the Office Action is debatable.

First, it is not true to say that the heat treatment would be avoided or removed by one of skill in the art because the expected benefit may not be critical or needed in certain light rail applications.

This is an arbitrary assertion by the Office without support in the applied art or in the state of the art. According to column 4 of KAIS (lines 13 to 24) the complete railroad track

part is always subjected to a joint heat treatment. KAIS never suggests that this heat treatment could be optional.

Moreover, according to column 1, lines 60-65, the heat treatment conditions have to be chosen such that for high manganese steel solutions annealing is performed, i.e., the properties of the high alloyed steel have to be considered.

Therefore, BHADESHIA, which relates to low or medium alloyed steel only, is not relevant.

The Office Action also makes assertion regarding the intermediate product. However, these assertions do not pertain because the present invention is drawn to a final product and not an intermediate product.

Further distinctions of the present invention over the applied art are of record in the application which, for brevity, are not repeated here.

The teachings of the applicant's disclosure do not address the deficiencies of the applied art discussed above.

One of ordinary skill and creativity would thus fail to produce a claimed embodiment of the present invention from a knowledge of the applied art. A *prima facie* case of unpatentability has thus not been made.

Also, the present invention displays results unexpected over the applied art. First, these unexpected results are shown in the weld quality of the photomicrograph of Figure 2,

reproduced above. Additional unexpected results are shown in the hardness properties shown in Figures 3 and 4, reproduced below.

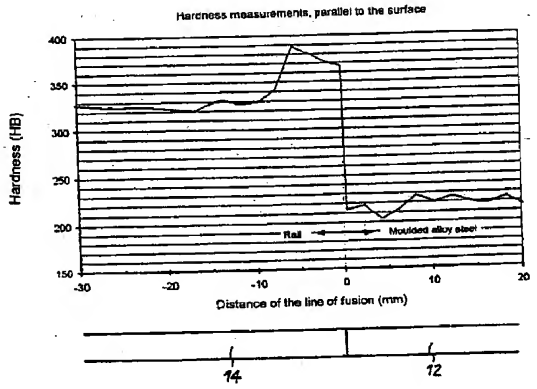

FIG.3

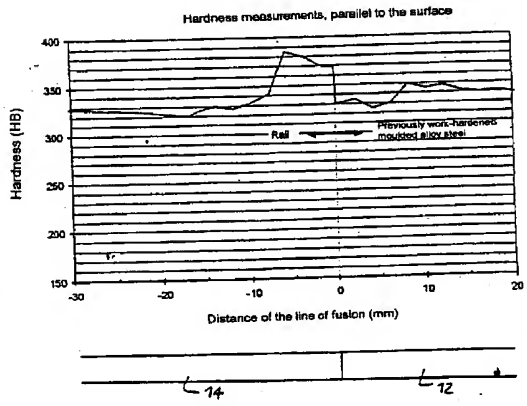

FIG.4

Here, it is observed that, with the compositions according to the invention, the hardness remains satisfactory in the immediate vicinity of the flash weld, and is not less than the hardness specific to the two elements which are welded to one another, and that in particular there is no drop in the hardness in the HAZ.

That is, these drawing figures show that, in its running part, the length of rail 14 has a hardness of between 290 and 330 HB and that this hardness increases to reach a value close to 380 HB in the immediate vicinity of the flash weld. The

hardness of the stretch of rail remains at a value of between 185 and 235 HB in the switch element 12 made from high-alloy steel. This hardness corresponds to the hardness of the switch element before welding.

The advantages of the present invention are thus clear, and any unpatentability of the present invention that could be alleged is fully rebutted.

These rejections are believed to be overcome, and withdrawal thereof is respectfully requested.

CONCLUSION

The rejections are believed to have been overcome, obviated or rendered moot. No issues remain. The issuance of a Notice of Allowability is accordingly respectfully solicited.

The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

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